BIOLOGICAL AND TAXONOMIC NOTES ON ERYTHRONEURA

(HOMOPTERA, CICADELLIDAE)

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During our investigations of the Cicadellinae of the Corn Belt States, the genus *Erythroneura* has proven to be a real challenge in both a biological and taxonomic sense. Our studies were undertaken with the intent of completing a treatment of the subfamily as a second part of the "Leafhoppers of Illinois." With *Erythroneura* it was realized early that one of the greatest needs was to discover the biologic significance of the species, most of which were then known only from hibernation or vernal collections. After three seasons of host collecting it is obvious that much more information is still needed, but a few generalities about the genus seem worth recording at this time.

HOST RELATIONSHIPS

Species of *Erythroneura* overwinter as adults. In areas of winter or moderate cold, the adults emerge from duff and feed in spring on the first leaves of shrubs or trees, favorites being various species of *Ribes* or *Aesculus*. In Florida the adults are active all year, but during the winter season the species which have deciduous hosts appear to feed on such evergreen shrubs as *Rubus* and *Myrica*.

Later in the spring or early summer, the various species of *Erythroneura* leave their early season food plants and seek out the various definitive hosts on which the eggs are laid and the nymphs develop. These hosts are mostly trees but include a few shrubs, vines, and woody herbs. Within the Obliqua and Maculata Groups a high degree of host specificity is exhibited by each species. Occasionally the host range covers a plant family, as for example certain species which occur on both *Quercus* and *Fagus*. More common are species which occur on several species of one plant genus, as for example several species which seem to occur on any member of the *Quercus alba* group of oaks. Certain species of *Erythroneura*, however, appear to be restricted rigidly to a single member of the host genus. A striking example of this is shown by four or five species of *Erythroneura* which are restricted to *Quercus imbricaria*. Other examples include a pair of species apparently restricted to *Ulmus americana* and *alata*, respectively, and a number restricted to *Cornus florida*.

We have only a small amount of evidence as yet regarding the differences in *Erythroneura* fauna exhibited by the same or related plant species in different parts of their ranges. There is an interesting case with *Alnus:* in northern Michigan it harbors chiefly *nitida* Beamer, in southern Illinois chiefly *rugosae* R. & D., and in northern Illinois we have been able to find no *Erythroneura* at all on it. Similarly the northern and southern faunae of the maples are different, but we have not yet analyzed our data sufficiently to know whether initially observed differences are significant.

TAXONOMIC UNITS

Evidence from many collections on true hosts indicates that, in the main, the species of *Erythroneura* as treated by Beamer, Knull, and other recent authors are sound biologic units. As is the case in many other genera, some species have a relatively small degree of variation, whereas a few exhibit a startling diversity in variational extremes. Possibly the most puzzling example we have encountered

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to date is the elm inhabiting *basilaris* complex, which presents some evidence that it is a freely interbreeding group of formerly distinct subspecies or near species.

Another interesting type of circumstance is the occurrence of pairs of seemingly distinct species in which the two species differ in only one observed trait. An example is the *rubroscuta-aesculella* pair which breed on the same host, *Aesculus*. The two species differ only in that the ventral processes of the aedeagus are appressed to the phalicata in *rubroscuta*, but arise well below the phalicata in *aesculella*. It is possible that this difference represents the expression of only one or a few genes, and that merely dimorphism is involved. Yet in other similar cases each species of the pair is on a different host and the two Erythroneuras exist as demonstrably different biologic entities. Hence it seems necessary to regard non-intergrading morphological entities as good species whether this is substantiated by known biologic differences or not.

There still appear with some regularity odd specimens which differ markedly from known forms, and which probably represent distinct species for which we need to search further to establish the host, range, and limits of variation. Descriptions of some of these appear in the following pages.

DESCRIPTIONS OF NEW SPECIES

OBLIQUA GROUP

We are restricting this group to only those species belonging to the closely-knit aggregate containing the species *obliqua* (Say), and characterized by the hook-shaped pygofer hook set off at the base by a distinct suture (fig. 12*D*).

For the species previously considered as the "Western Obliqua Group" we propose the term *Apacha Group*, named for the species *apacha* Beamer, a typical member. In his treatise on this group, Beamer pointed out the complete lack of relationship between these and the true Obliqua Group. As a matter of fact, the Apacha Group is one of the most primitive in the genus and the Obliqua Group one of the most specialized.

Erythroneura juglandacea n. sp.

Both the black dorsal stripe and the aedeagus indicate the close affinity between this species and *atrimucronata* Beamer. From *atrimucronata*, *juglandacea* differs in the longer posterior point of the style and details of the aedeagus.

Length 3 mm. Ground color pale lemon yellow, with a black dorsal stripe extending the entire length of the insect, beginning as a pointed area at the anterior margin of the head and covering all but the sides of the pronotum and elytra back to the cross-veins, beyond which the stripe extends across the entire width of the elytra. Venter with part of mesosternum and most of abdomen black. Male genitalia as in figure 1. Pygofer hook evenly curved. Style with foot oblique to shaft, with sharp heel, minute anterior point, and elongate posterior point which is as long as foot. Aedeagus with large base which is angular ventrad, with no processes, but with a deep and fairly narrow phalicata; this latter is curved dorsad toward apex, and has a pair of sharp, short flanges directed outward and slightly backward.

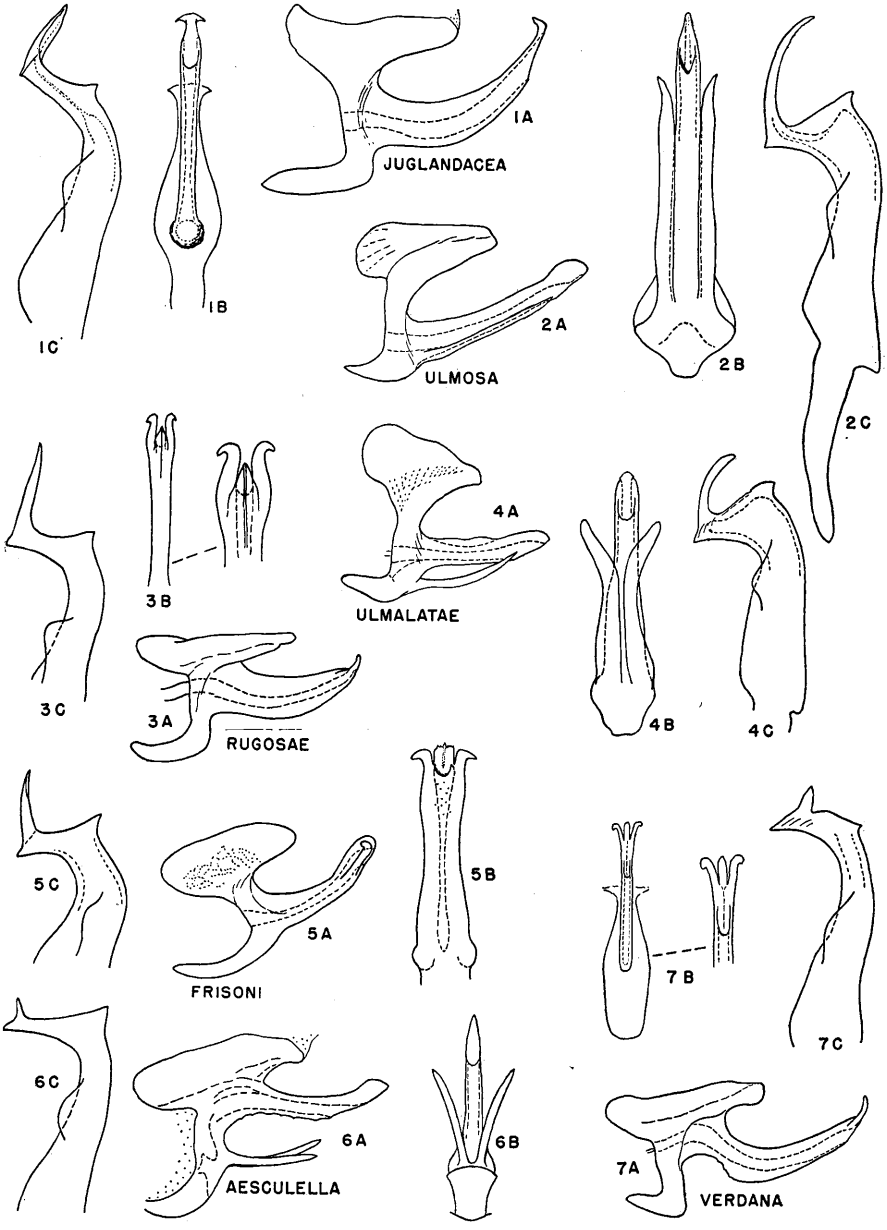
Holotype, male, Horseshoe Lake, Olive Branch, Ill., Aug. 16, 1951, on *Juglans nigra*, Ross & Stannard. Allotype, female, same data. Paratypes, same data, 6♂, 8♀; Hord, Ill., Aug. 31, 1951, on *Juglans nigra*, Ross & Richards, 1♂, 4♀.

Erythroneura ulmosa n. sp.

A close relative of *harpax* Beamer, differing in the longer phalicata and appressed ventral processes of the aedeagus.

Length 3 mm. Color in general coppery green, the head and pronotum lighter, with indications of reddish stripes, the elytra darker, the area beyond the cross-veins very dark, the abdomen entirely dark brown. Male genitalia as in figure 2. Pygofer hook evenly curved. Style with foot angled back slightly upon the shaft, the heel prominent, the anterior point minute, the posterior point very long, curved over the instep and attaining a length greater than the foot.

Aedeagus with phalicata arising at the ventral margin of the socket, with a pair of elongate ventral processes arising beneath it and extending nearly the full length of the phalicata; this latter structure is nearly cylindrical, elongate, and nearly straight, with only a slight dorsal enlargement at extreme apex.



FIGURES 1–7. Male genitalia of *Erythroneura*. *A*, lateral aspect of aedeagus; *B*, ventral aspect of phalicata; *C*, style. Figures 1*A*, 1*B*, 2*B*, 4*B* and 5*B* are 1.5 times the magnification of the others.

In many specimens the dark coppery green on the elytra is poorly developed, in which case the basic red striping characteristic of the group shows clearly through the green and may be the dominant note in the pattern.

Holotype, male, and allotype, female, Shawneetown, Ill., July 14, 1948, on *Ulmus americana*, Mills & Ross. Paratypes, 66 ♂; 8 ♀, from Chillicothe, Ohio, and the following localities in Illinois: Anna, Centralia, Dixon Springs, Eichorn, Fairfield, Gibsonia, Karbers Ridge, Kickapoo St. Pk., Louisville, Makanda, Marshall, Monticello, Muncie, Oliver, Paris, Rocky Branch, Shawneetown, Thebes, Urbana, Watseka, Westport, White Heath.

Erythroneura ulmalatae n. sp.

The short aedeagus and curved ventral processes indicate a close affinity between this species and *harpax*, but *ulmalatae* may be distinguished readily by the short posterior point on the style.

Length 3 mm. Color a faded greenish yellow, with faint stripes on the pronotum and head, and with the elytra a darker shade of coppery green. Male genitalia as in figure 4. Pygofer hook evenly curved. Style with foot angled back on the shaft, with a minute anterior point but a long posterior point, nearly as long as foot and curved over the instep. Aedeagus with narrow socket; phalicata of moderate length, slightly curved dorsad, enlarged a trifle at apex, bearing a small dorsal carina at base, and attached near ventral margin of socket; below it arise a pair of long ventral processes which curve slightly upward and outward, and usually are seen curving back over the silhouette of the phalicata.

Holotype, male, Golconda, Ill., July 15, 1948, Mills & Ross, on *Ulmus alata*. Paratypes, same data, 6 ♂; Ozark, Ill., May 3, 1950. Sanderson & Stannard, 1 ♂; Karbers Ridge, Ill., Apr. 22, 1935, T. H. Frison, 1 ♂; Makanda, Ill., Mar. 26, 1935, Ross & Mohr, 1 ♂.

Erythroneura rugosae n. sp.

This species is most closely related to *jocosa* Beamer and *spatulata* Beamer, differing in the deep phalicata with the apical pair of short, stout, outcurved processes.

Length 2.8 mm. Color a light cream with yellow vittae extending from the head, across the pronotum, and along the elytra; the elytra have small dusky spots in the apex of the cells, and the membrane is darker. Abdomen cream with pairs of suffuse dark bars dorsally on each segment. Male genitalia as in figure 3. Pygofer hook evenly curved. Style with foot nearly at right angles to shaft, with a short anterior point and a long posterior point which is longer than the foot and projects nearly straight posteriad from it. Aedeagus with small socket and a large, deep, and fairly thin phalicata which arises from near the middle of the socket and bears no processes except at extreme tip. The tip forms three projections, a short, pointed mesal one flanked on each side by a longer, stout process curving laterad at tip.

Holotype, male, Dixon Springs, Ill., July 15, 1948, Mills & Ross, on *Alnus rugosa*. Paratypes, all from Illinois and on *Alnus rugosa*, same data as holotype, 4 ♂; Eichorn, Aug. 17, 1951, Ross & Stannard, 2 ♂, 6 ♀; Dixon Springs, Aug. 30, 1951, Richards & Ross, 15 ♂.

This appears to be the only species of *Erythroneura* having *Alnus* as its host in sonthern Illinois. It has not been taken either in northern Illinois or Michigan.

Erythroneura frisoni n. sp.

Also allied to *spatulata*, this species is differentiated on the outcurved processes of the phalicata and the slightly transverse oval of its cross-section. From *jocosa* it differs in the long posterior point.

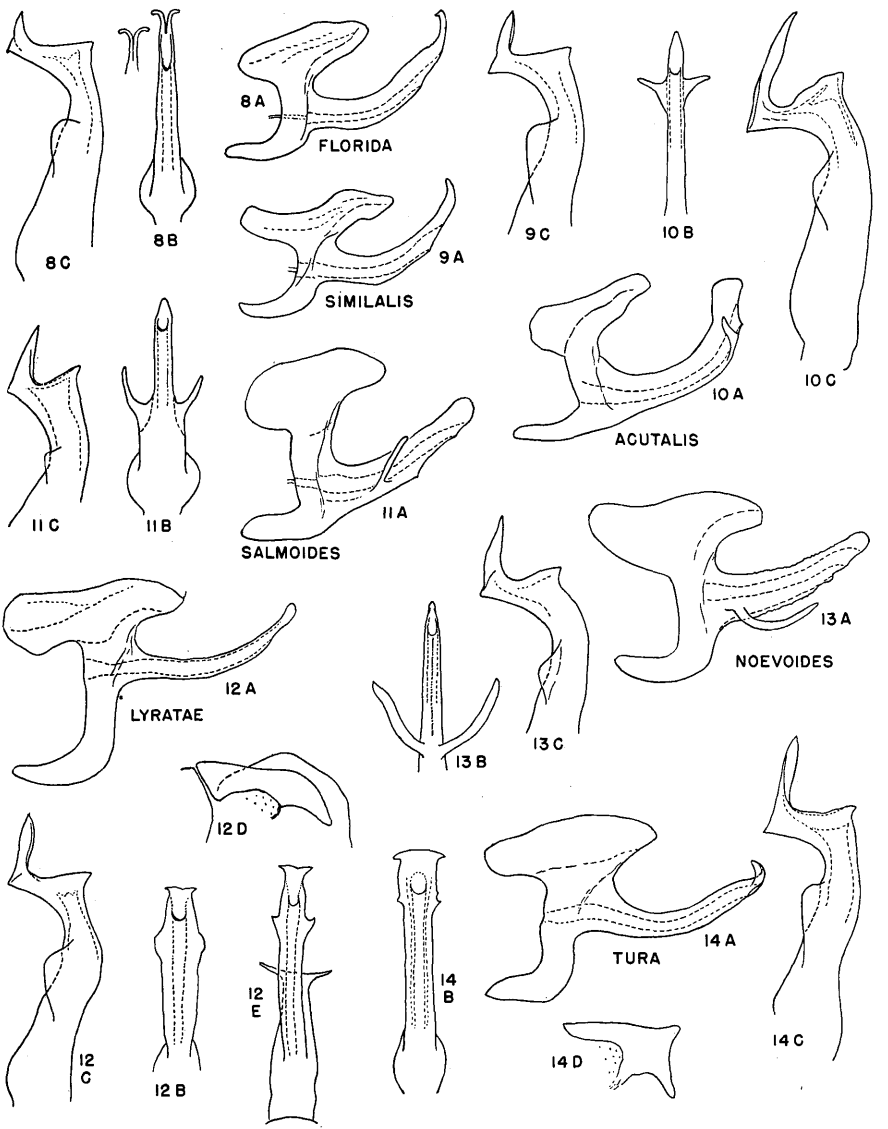
Length 2.8 mm. Color cream with a pair of pale red vittae extending over the head and pronotum, and two red vittae extending almost the full length of each elytron. Male genitalia as in figure 5. Pygofer hook evenly curved. Style with foot slightly angled back on shaft, with a sharp but short anterior point and a very long, sharp posterior which is nearly as long as foot and projects directly posteriad from it. Aedeagus with phalicata arising from near middle of socket, wider laterally than dorso-ventrad, slightly curved upwards, and with processes only at extreme tip. Tip divided into a truncate and somewhat crestlike mesal portion and a pair of lateral processes which are short, stout, and angled abruptly laterad.

Holotype, male, Gibsonia, Ill., Oct. 2, 1934, Frison & Ross.

Erythroneura verdana n. sp.

This species is a very close relative of *victorialis* Knull, differing from it in lacking the V-shaped red markings so characteristic of *victorialis*, and in having the mesal process of the phalicata as long as the lateral ones.

Length 2.8 mm. Color pale greenish yellow except for a red triangle in the apex of the clavus, occupying about half of it. When the wings are folded this makes a conspicuous red triangle in sharp relief against the greenish background. Male genitalia as in figure 7. Pygofer hook evenly rounded. Style with foot nearly at a right angle to shaft, with a moderately long



FIGURES 8–14. Male genitalia of *Erythroneura*. *A*, lateral aspect of aedeagus; *B*, ventral aspect of phalicata of paratype; *C*, style; *D*, lateral aspect of pygofer hook; *E*, ventral aspect of aedeagus of holotype. Except for figures 8*A* and 9*A*, all *A*, *B*, and *E* drawings are 1.5 times the magnification of the others.

anterior point directed mostly laterad, and a slightly longer posterior point projecting at right angles to the foot. Phalicata arising out of middle of socket, bent sharply ventrad at base, then angling dorsad, deep but fairly narrow, the apex divided into three parts, a finger-like mesal projection, and a pair of lateral projections curving slightly laterad and ending in a round, lateral angulation.

Holotype, male, Alum Cave area, Great Smoky Mountains National Park, Tenn., Sept. 1, 1948, Ross & Stannard.

Erythroneura aesculella n. sp.

A close ally of *rubroscuta* (Gillette), this species differs so far as known only in the ventral position of the ventral processes of the aedeagus.

Length 3.2 mm. Color creamy yellow with two transverse red bands across the body, one occupying the entire exposed area of the thoracic nota, the other crossing the middle of the elytra, as in *rubroscuta*. Genitalia as in figure 6. Pygofer hook evenly curved. Style slightly angled back on the shaft, with a short, sharp anterior point projecting mostly laterad, and a slightly longer posterior point extending directly posteriad from the foot. Aedeagus with phalicata arising a little dorsad of the middle, and with a pair of stout, long ventral processes arising some distance below the base of the phalicata. Phalicata nearly straight, upturned only toward apex, with lower margin serrate, and apex produced dorsad into a mesal crest appearing pointed from ventral view.

Holotype, male, Brownfield Woods, Urbana, Ill., Aug. 9, 1948, Becker & Ross, on *Aesculus glabra*. Paratypes, same data, 21 ♂; same data but July 28, Sanderson et al., 9 ♂; April 29, 1920, 1 ♂; Cottonwoods, Urbana, Ill., July 20, 1920, 2 ♂; Alum Cave area, Great Smoky Mountains National Park, Sept. 1, 1948, Ross & Stannard, on *Aesculus* sp., 2 ♂.

This species and *rubroscuta* occur together abundantly at Urbana, but no intergrades between the two have been found to date. Both are confined to *Aesculus*, except for occasional strays on surrounding trees.

Erythroneura florida n. sp.

This and the following species appear to be somewhat ancestral to the species related to *victorialis*, in that the aedeagus is divided into a pair of long processes at the apex. They differ, however, in having no mesal projection between the lateral ones.

Length 2.9 mm. Color cream with typical red vittae, a pair extending across the head and over the pronotum, and another pair on each elytron. Male genitalia as in figure 8. Pygofer hook evenly curved. Style with foot at almost a right angle to shaft, with a sharp angulation for the anterior point, and with the posterior point less than half length of foot, sharp, and curved very slightly mesad at tip. Phalicata arising below middle of socket, curved upward, deeper than wide, and with the apex divided into a pair of long, slender processes which curve laterad and dorsad. Other than these there are no lateral or ventral processes present.

Holotype, male, allotype, female, and 11 ♂, 20 ♀ paratypes, Perry, Fla., Dec. 17, 1949, Stannard et al., on *Myrica cerifera*.

There is some doubt as to whether or not these individuals were taken on their normal host plant, or whether they were simply feeding on the *Myrica* during the period when their regular host was defoliated. Other species of the group are known to have *Quercus* as their host, which would seem to favor the second alternative.

Erythroneura similalis n. sp.

The dorsal red stripe of this species resembles that of *lawsoniana* to a startling degree, but the two species are not at all closely related. From the preceding species, *florida*, the present one differs in the slightly shallower phalicata and the much longer posterior point, in addition to the distinctive dorsal red stripe.

Length 3 mm. Color cream with a dorsal red stripe extending from the head to the membrane of the elytra. This stripe occupies about half the head width, half the pronotum, and merges with the claval stripe of the elytra and then with the apex of the medial stripe. Male genitalia as in figure 9. Pygofer hook evenly curved. Style with foot at nearly a right angle to shaft,

with a short anterior point and a much longer posterior point which is nearly as long as foot and forms a slightly acute angle with it. Aedeagus with phalicata arising near middle; the phalicata is deeper than wide and is divided at apex into a pair of lateral processes almost exactly like those of *florida* (fig. 8B).

Holotype, male, and 2♂ paratypes (one without abdomen), Chiefland, Fla., Dec. 17, 1949, Stannard et al., on *Quercus myrtifolia*.

Erythroneura acutalis n. sp.

In color and structure of aedeagus, this species is similar to *tenuispica* Beamer, but differs in having the elongate posterior point of the style at an acute angle with the foot.

Length 2.8 mm. Color cream with the usual red vittae down head and pronotum and along elytra. Male genitalia as in figure 10. Pygofer hook evenly rounded. Style with foot curved slightly back on shaft, anterior point represented only by an angular corner, posterior point elongate, longer than foot, and forming an acute angle with it. Aedeagus with phalicata occurring near ventral margin, the phalicata curved gently upward, slightly deeper than wide, with a pair of lateral projections near apex, and the apex itself produced dorsad into a small crest which is pointed as seen from ventral view.

Holotype, male, and 3♂ paratypes, White Spring, Fla., Dec. 11, 1949, Stannard et al. These specimens were taken sweeping a mixture of *Salix*, *Myrica*, and two species of *Quercus*, occurring in a small humid pocket of an otherwise dry pine woods.

Erythroneura salmoides n. sp.

The general pattern of genitalia indicates a kinship of this species with *tenuispica* Beamer, from which it differs markedly in the basal position of the ventral processes of the phalicata and the broad, sharp posterior point of the style.

Length 2.8 mm. Color pale cream with the usual vittae over the head and pronotum and along the elytra, the vittae moderately narrow and a delicate salmon pink; the apices of the discal cells each have a dusky spot. Male genitalia as in figure 11. Pygofer hook evenly rounded. Style with foot angled slightly back on shaft, with anterior point represented only by an angulation, and with posterior point as long as foot and broad at base, tapering to a sharp point, and making an acute angle with the instep. Aedeagus with phalicata arising close to ventral margin, the phalicata nearly straight with a slight dorsal crest at apex, and with a pair of latero-ventral processes arising just below middle; below this point the phalicata is fairly robust, but beyond it narrows markedly.

Holotype, male, Rocky Branch Cr., Oliver, Ill., Apr. 22, 1949, Ross & Stannard.

Erythroneura noevoides n. sp.

This species is a member of the *noeva* complex, differing from *noeva* Gillette in the widely divergent ventral processes of the phalicata, and from *hamata* Beamer in the posteriorly directed posterior point of the foot.

Length 3 mm. Color cream with typical vittae on head, pronotum and elytra, the vittae pale red and not very conspicuous. Male genitalia as in figure 13. Pygofer hook evenly curved. Style with foot slightly angled back on shaft, the anterior point represented by an angulation, the posterior point as long as the foot, and held at nearly a right angle with it. Aedeagus with phalicata arising near middle of socket, the phalicata deeper than wide, curving slightly dorsad, with both upper and lower margins slightly serrate, the apex with a small dorsal crest, and with a pair of long, divergent ventral processes arising from near the base and curving latero-posteriad.

Holotype, male, Marshall, Ill., Apr. 22, 1949, Ross & Stannard. Paratypes, Rocky Branch Cr., Oliver, Ill., Apr. 22, 1949, Ross & Stannard, 2♂ (abdomens only).

Erythroneura lyratae n. sp.

This species is a close relative of *volucris* Beamer, from which it differs in the evenly rounded pygofer hook and the lack of ventral flanges on the aedeagus.

Length 3 mm. Color a pale cream, with the usual vittae across head and pronotum, these vittae yellowish or partially red, but always with a greenish caste which is quite pronounced;

apex of elytral cells with a faint dusky spot at cross-veins. Male genitalia as in figure 12. Pygofer hook evenly rounded. Style with foot about at right angles to shaft, the anterior point represented by an angulation, the posterior point as long as the foot and held at right angles to it. Aedeagus with phalicata arising from near middle, the phalicata curving gently dorsad, slightly wider than deep, narrowed near tip into a slightly incised apex with a pair of small, lateral sharp points; basad of this the phalicata bears a pair of small lateral flanges which may end in sharp points.

Holotype, male, allotype, female, and numerous ♂ and ♀ paratypes, Grantsburg, Ill., Aug. 17, 1951, Ross & Stannard, on *Quercus lyrata*. Additional paratypes are from Dale, Ill., July 15, 1947, L. J. Stannard, on *Quercus lyrata*.

Whereas this species seems to be fairly common on *Quercus lyrata* in southern Illinois, we have taken only a single stray of *volucris* on this host. The host of *volucris* is not yet known for certain, but it may be *Crataegus*.

Erythroneura tura n. sp.

Another close relative of *volucris*, this species differs in having a sharper dorsal point on the pygofer hook, and no longutidinal ventral flanges on the phalicata.

Size and color as in *lyratae* (see above). Male genitalia as in figure 14. Pygofer hook with a sharp dorsal projection, giving it a crested appearance. Style as in *lyratae*. Phalicata also similar in most points, but having only minute lateral projections just below the opening of the gonopore, and having the apex with ventral aspect arcuate.

Holotype, male, Mermet, Ill., Sept. 20, 1950, Ross & Evers, on *Quercus phellos*. Paratype, Karbers Ridge, Ill., Apr. 22, 1935, T. H. Frison, ♂.

Erythroneura zephyr n. sp.

The aedeagus places this species as a close relative of *cornipes* Beamer, but it differs in the different type of style and the shape of the apex of the phalicata.

Length 3 mm. Color cream with the usual vittae on head, pronotum, and elytra a reddish pink and only moderately bright. Male genitalia as in figure 15. Pygofer hook evenly rounded. Style with apex curving into foot; anterior point produced as a short, sharp projection; posterior point over half length of foot and projecting almost directly posteriad from it. Aedeagus with phalicata arising from near middle of socket; phalicata curved dorsad, its apex widened into a pair of large, angular lateral projections, with a small, pointed mesal projection arising between them.

Holotype, male, North of Marion, Ill., Sept. 21, 1950, on *Quercus imbricaria*, Ross & Evers. Paratype, Alma, Ill., Sept. 21, 1950, on *Quercus imbricaria*, Ross & Evers, ♂.

Although both specimens of this species were taken on *Quercus imbricaria*, it is possible that both were drifts, and this oak should not yet be regarded as the host of this leafhopper.

Erythroneura wysongi n. sp.

This species is most curious in that the ventral aspect of the aedeagus looks like an arrow-head exactly like that of *sagittata*, but the projecting parts are reversed. In *sagittata* it is the phalicata which bears the lateral triangular parts, whereas in *wysongi* it is the ventral processes.

Length 2.8 mm. Color: venter blackish, face reddish brown; dorsum cream color along the sides, the red vittae having widened and met along the meson to form a continuous central brick red band from the tip of the head to the end of the corium. Male genitalia as in figure 16. Pygofer hook evenly rounded. Style not greatly narrowed below the foot, anterior point short and projecting laterad, posterior point broad at base, tapering evenly to a sharp point, and about half length of foot. Phalicata arising from near middle of socket, fairly straight and nearly tubular; ventral processes arising from base of phalicata, extending almost to its tip, and each with a wide lateral expansion, the two together with the phalicata giving an arrow-head appearance to the ventral aspect.

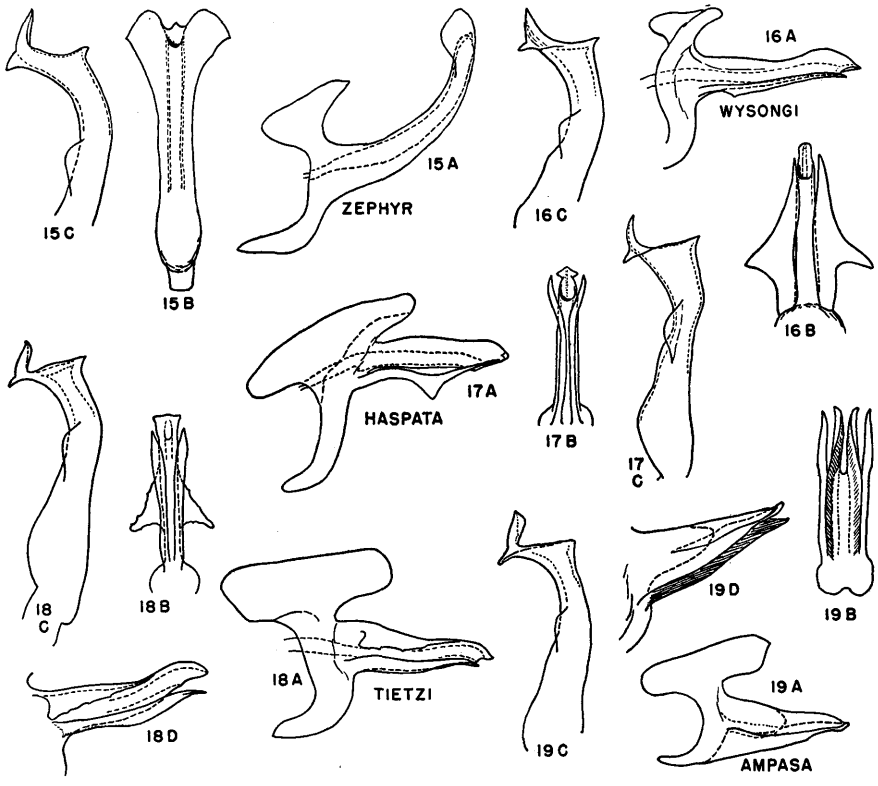
Holotype, male, Bemis Woods, Cook Co., Ill., July 2, 1949, Ross & Stannard, on *Crataegus mollis*. It is highly likely that this specimen was collected on its true host, since many other related species feed on *Crataegus*.

This species is named in gratitude to Noel B. Wysong, Forestor of the Cook County Forest Preserve District, who has been of inestimable help in assisting with our collecting program in Cook County.

Erythroneura haspata n. sp.

This species is closest to *plena* Beamer and *wysongi* n. sp., differing most conspicuously from the former in the ventral process on the ventral process of the aedeagus, and from the latter in the ventral direction of these processes.

Length 2.9 mm. Color cream with the face and the usual vittae on head, pronotum, and elytra lemon yellow to moderately bright red. Male genitalia as in figure 17. Pygofer hook



FIGURES 15–19. Male genitalia of *Erythroneura*. *A*, lateral aspect of aedeagus; *B*, ventral aspect of phalicata; *C*, style; *D*, quartering view of phalicata. *A*, *B*, and *D* drawings are 1.5 times the magnification of *C* drawings.

evenly curved. Style with apex broadening rather imperceptibly into foot, anterior point short, posterior point about twice as long and curving slightly mesad, otherwise nearly at right angles to instep. Aedeagus with phalicata arising fairly close to dorsal margin of socket; phalicata slightly deeper than wide, nearly straight and produced at apex into a pair of small projections directed laterad; ventral processes arising just below base of phalicata, sinuate, as long as phalicata, and each bearing a triangular ventral projection just beyond middle.

Holotype, male, Thornton, Ill., Sept. 7, 1949, Ross & Stannard, on *Corylus americana*. Paratype, Eichorn, Ill., Mar. 27, 1935, Ross & Mohr, ♂.

Erythroneura tietzi n. sp.

A close relative of *sagittata* Beamer, this species differs primarily in the characters of the foot. In *sagittata* the posterior point is oblique with the foot and tapers gradually to a curved apex,

as in *funesta* Beamer and several other species; in *tietzi*, on the other hand, the posterior point is acute with the foot and of equal thickness almost to the tip, resembling the condition found in *electa* McAtee.

Length 2.8 mm. Color: venter, including face, dark brown, almost black; dorsum with head and pronotum cream with wide dark brownish-red vittae, and with elytra brownish olive with two creamy marks formed when the wings are folded, an anterior triangular one and heart shaped one which ends at the edge of the corium; the reddish vittae are present on the elytra but obscured and modified by the above pattern. Male genitalia as in figure 18. Pygofer hook evenly curved. Style curving only slightly into foot, anterior point short, blunt, and projecting chiefly laterad, posterior point longer and acute with instep. Aedeagus with phalicata arising near middle of socket; phalicata nearly straight, the tip with the dorsal margin sloping ventrad, the sides with wide, triangular expansions, the two together forming an arrow-head shaped structure; ventral processes arising from base of phalicata and appressed to it for their entire length.

Holotype, male, and allotype, female, Bemis Camp, Cook Co., Ill., Jn. 21, 1949, Ross & Tietz, on *Crataegus mollis*. Paratypes, same locality and host, Jn. 21, Jly. 2, and Sept. 9, 1949, 16 ♂, 22 ♀.

It is perhaps significant that we have taken this species only in extreme northern Illinois, whereas its relative *sagittata* has been collected only in southern Illinois.

Erythroneura ampasa n. sp.

This species is similar to *tietzi* in color and in shape of style, but exceedingly different in the foliaceous divisions of the aedeagus.

Length 2.8 mm. Color as for *tietzi*, described above. Male genitalia as in figure 19. Pygofer hook evenly curved. Style with foot nearly at right angles to shaft, the anterior point short and slender, the posterior point longer and robust for nearly its entire length, and acute with the instep. Aedeagus with phalicata arising from near base of socket, the phalicata broad at base, tapering gradually to a sharp apex, and cleft down meson to near midpoint; each half is again divided into two flat processes which overlap slightly and are difficult to distinguish. The ventral pair of flat processes may represent the ventral processes which in other species are more nearly finger-like.

Holotype, male, Kappa, Ill., Sept. 29, 1950, Ross & Stannard, on *Crataegus mollis*.

MACULATA GROUP

Erythroneura imbricariae n. sp.

This species is apparently most closely related to *gillettei* Beamer, differing in the entirely different shape of the processes of the aedeagus and the short posterior point.

Length 2.8 mm. Color creamy with faint reddish dots and bars of the usual type for the group. Male genitalia as in figure 20. Pygofer hook short, broad at base, curved ventrad at apex. Style with foot slightly obtuse with shaft, with sharp heel but with both anterior and posterior points represented only by an angulation. Phalicata arising from about middle of socket, angled sharply dorsad, and bearing a pair of recurved thornlike processes at apex, and having a pair of elongate and slender ventral processes arising from its base and directed laterodorsad. From posterior view these processes coincide to a remarkable degree with the slender lateral extensions of the socket.

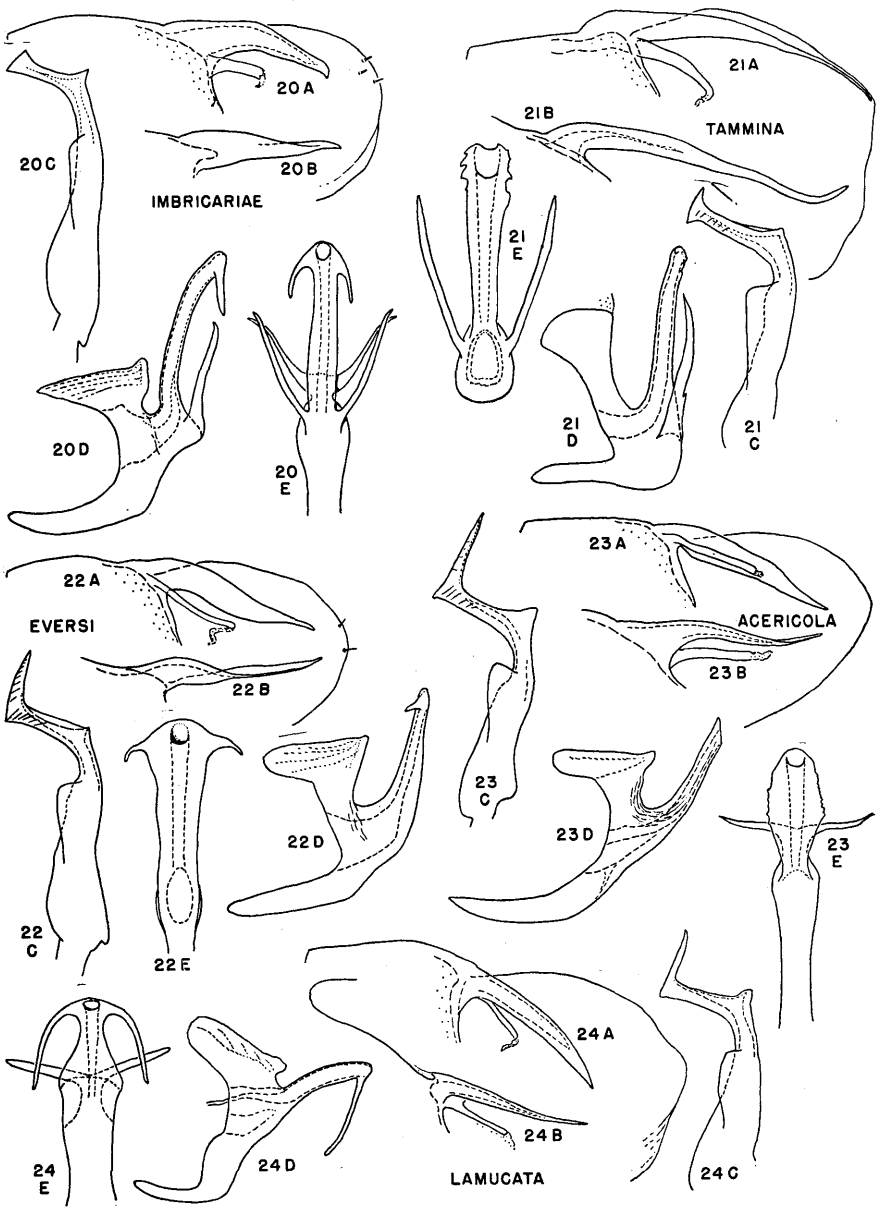
Holotype, male, Fairfield, Ill., July 14, 1948, Mills & Ross, on *Quercus imbricaria*. Paratypes, 10 ♂, all from *Quercus imbricaria* except two from a hybrid *Q. imbricaria* x *falcata*, from Danville, north of Marion, Monticello, Kickapoo State Park, and Shawneetown, Ill.

Shingle oak, *Q. imbricaria*, is undoubtedly the true host for this species. It is a fairly constant component of the shingle oak fauna, although never as abundant as some of the other members of the genus such as *confirmata* McAtee.

Erythroneura tammina n. sp.

This species is probably most closely related to the preceding, differing in lacking the apical processes of the phalicata, and in details of all other parts of the male genitalia.

Length 2.9 mm. Color as for *imbricariae*. Male genitalia as in figure 21. Pygofer hook elongate, wide at base and gradually tapering to a slender, whiplike apex. Style with foot oblique to shaft, with a small, angular anterior point, and a slightly longer, sharp posterior point. Aedeagus with phalicata arising near ventral margin of socket; phalicata angled sharply dorsad, wider than deep, expanding to apex which is bordered with a few serrations, and with a pair of



FIGURES 20–24. Male genitalia of *Erythroneura*. *A*, *B*, lateral and dorsal aspects, respectively, of pygofer hook; *C*, style; *D*, *E*, lateral and ventral aspects, respectively, of aedeagus. *D* and *E* drawings are 1.5 times the magnification of the others.

long slender processes arising from its base. The left process has a slight notch near base, the right process is smooth throughout.

Holotype, male, Northwest of Tamms, Ill., Sept. 20, 1950, Ross & Evers.

Erythroneura eversi n. sp.

A close relative of *lata* Beamer, this species differs in the longer posterior point and the sharp lateral processes at the apex of the phalicata.

Length 2.8 mm. Color cream with very pale yellow or slightly reddish markings of the type usual for the genus. Male genitalia as in figure 22. Pygofer hook short, sinuate, broad at base and narrowed to a slender, finger-like tip. Style with foot oblique to shaft, the anterior point represented only by an angulation, the posterior point nearly as long as foot and just a trifle oblique to the instep. Phalicata arising near ventral margin of socket, bent dorsad at a distinct angle, lateral aspect wide at base, tapering to apex, posterior aspect just the reverse, widening toward apex which is produced laterally into a pair of fairly long, sharp processes curving slightly backwards on the phalicata.

Holotype, male, Northwest of Tamms, Ill., Sept. 20, 1950, Ross & Evers, on *Corylus americana*. Paratypes, same data, 10♂; Olmsted, Ill., Jly. 15, 1948, Sanderson & Stannard, 2♂; Rocky Branch, Clark Co., Ill., Sept. 14, 1949, Stannard & Ross, on *Corylus americana*, 1♂.

This delicate hazel species is named for Robert A. Evers, Assistant Botanist, Illinois Natural History Survey, who has been of tremendous aid to this project in identifying plant species and in taking us to unusual and productive collecting areas.

Erythroneura acericola n. sp.

This species also resembles *lata* Beamer superficially, but differs in that the phalicata narrows rather than widens at the apex.

Length 2.9 mm. Color cream with light red markings of the type usual for the group. Male genitalia as in figure 23. Pygofer hook fairly short, basal part broad, tapering to a sharp point. Style with foot nearly at right angles to shaft, the anterior point minute, the posterior point slightly longer than foot and extending directly posteriad from it. Aedeagus with very long ventral extension on socket, phalicata arising from near middle of socket; phalicata curving sharply dorsad, lateral aspect slender and regular, posterior aspect wider, narrowed at base and widest near middle, tapering again to apex, this latter portion finely serrate.

Holotype, male, Brownfield Woods, Urbana Ill., Aug. 9, 1948, Becker & Ross, on *Acer saccharum*. Paratypes, same data, 5♂; Marshall, Ill., Apr. 22, 1949, Ross & Stannard, 1♂; Funks Grove, McLean, Ill., Aug. 3, 1949, on *Acer saccharum*, Mills & Ross, 1♂; Foley's Woods, southwest of Paris, Ill., Apr. 22, 1949, Ross & Stannard, 1♂.

Erythroneura lamucata n. sp.

This species differs from *maculata* (Gillette), its closest relative, in the longer posterior point and the longer and down-curved apical processes of the phalicata.

Length 2.8 mm. Color cream with pale red markings typical of the group. Male genitalia as in figure 24. Pygofer hooks of only moderate length, bladelike and curved slightly ventrad. Style with foot slightly oblique to shaft, the anterior point merely an angulation, the posterior point nearly as long as foot and at about a right angle with instep. Aedeagus with phalicata arising near dorsal margin, the phalicata widest near base, tapering to apex, the ventral aspect vasiform; the apex of the phalicata gives rise to a pair of long, down-curved lateral processes which are as long as the phalicata.

Holotype, male, Lake Bloomington, Ill., Sept. 29, 1950, Ross & Stannard, on *Rhus toxicodendron*. Paratypes, same data, 1♂; Valmeyer, Ill., Jn. 18, 1948, Smith & Stannard, 1♂.

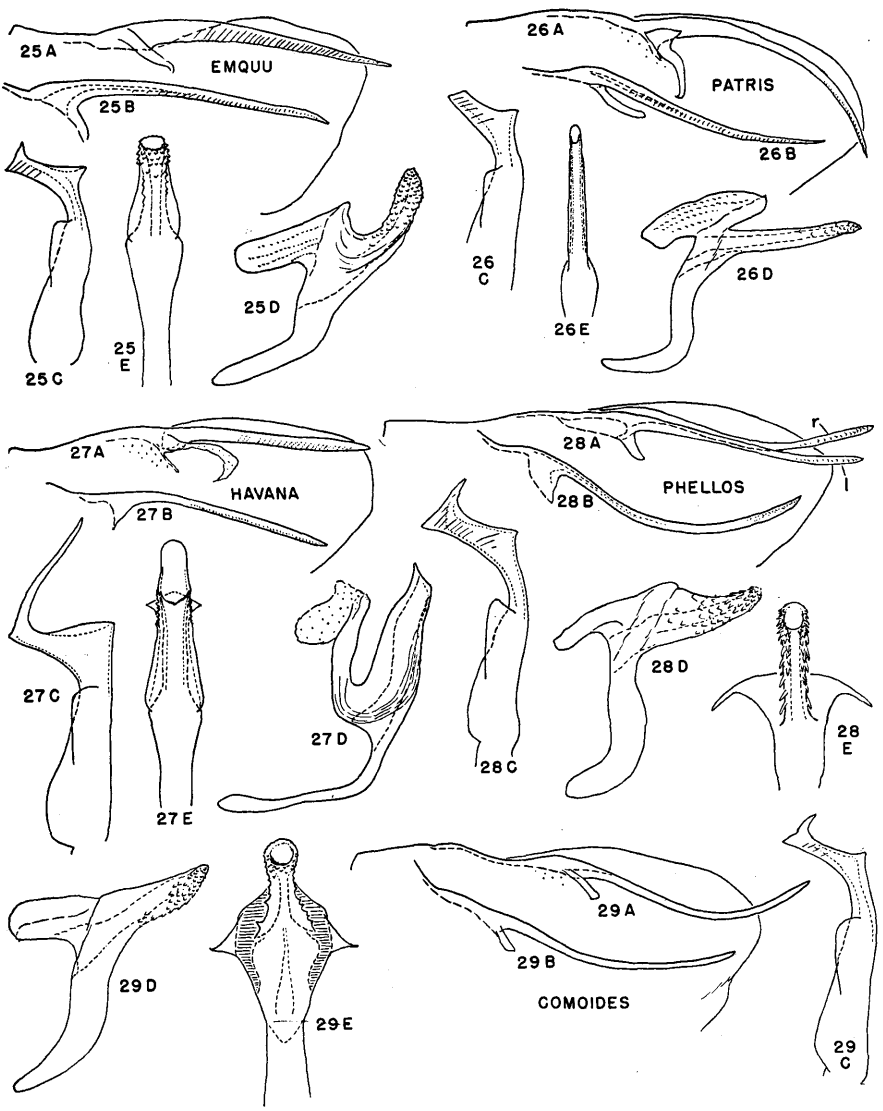
Erythroneura emquu n. sp.

This species most closely resembles *campora* Robinson, but differs markedly in the phalicata.

Length 3 mm. Color cream with fairly bright red spots of the usual pattern for the group. Male genitalia as in figure 25. Pygofer hook elongate, nearly straight and bladelike, tapering evenly from base to apex. Style with foot slightly oblique with shaft, the anterior point a sharp

angle, the posterior point a little longer and also forming a sharp angle. Phalicata arising from about middle of socket, curved sharply dorsad, its apical portion covered with minute teeth, and with a ventral flange along each side extending from base to near apex.

Holotype, male, Perry, Fla., Dec. 17, 1949, Stannard et al., on *Myrica cerifera*. Paratypes, same data, 1♂; Chiefland, Fla., Dec. 17, 1949, Stannard et al., on *Quercus myrtifolia*, 3♂.



FIGURES 25–29. Male genitalia of *Erythroneura*. *A*, *B*, lateral and dorsal aspects, respectively, of pygofer hook; *C*, style; *D*, *E*, lateral and ventral aspects, respectively, of aedeagus. *D* and *E* drawings are 1.5 times the magnification of the others.

Erythroneura patris n. sp.

Most closely related to *interna* Beamer, this species is distinguished by the less curved pygofer hook and the more slender phalicata.

Length 2.8 mm. Color cream with the usual pattern of light red markings typical for the group. Male genitalia as in figure 26. Pygofer hook elongate and curved into a near quadrant, tapering from base to middle and from there nearly uniform to apex. Style with foot oblique to shaft, with a sharp heel but with the anterior and posterior points represented by only slight angulations. Phalicata arising near dorsal margin of socket, straight and slender, extending almost posteriad, the tip with a few small points.

Holotype, male, and 6 ♂ paratypes, Grand Tower, Ill., Oct. 7, 1947, on *Quercus stellata* (one on *Q. bicolor*).

Erythroneura havana n. sp.

This species resembles *gemina* Beamer most closely, differing in the thick lateral aspect of the phalicata.

Length 2.8 mm. Color cream with light red spots usual for the group. Male genitalia as in figure 27. Pygofer hook straight and moderately long, bladelike. Foot at nearly a right angle with shaft of style, the anterior point minute, the posterior point much longer than foot and held at an acute angle with it. Aedeagus with long ventral strap on socket; phalicata arising near base of socket, lateral aspect deep, with the apex narrowed, the whole held nearly upright; on each side the phalicata bears a flange which runs from the base to near the lower lip of the gonopore.

Holotype, male, Havana, Ill., July 2, 1934, DeLong & Ross.

Erythroneura phellos n. sp.

This species appears to be most closely related to *spinifera* Beamer, but differs markedly in the narrow ventral aspect of the phalicata.

Length 2.8 mm. Color cream with light red markings typical for group but each one slightly more elongate than usual. Male genitalia as in figure 28. Pygofer hook elongate and curved mesad and slightly dorsad (note that in figure 28A both the right (*r*) and left (*l*) pygofer hooks are drawn superimposed, and that each is single). Style with foot oblique to shaft, the anterior point simply an angle, and the posterior point longer, slender and sharp, slightly acute with instep and nearly half as long as foot. Aedeagus with phalicata arising from dorsal margin, short and trianguloid from lateral view, narrow and straight sided from ventral view, armed with numerous teeth; the dorsal portion of the socket is unusual in that, instead of narrowing above the phalicata, it widens and forms a large sclerotized plate out of which the phalicata arises.

Holotype, male, and 5 ♂ paratypes, Mermet, Ill., Sept. 20, 1950, Ross & Evers, on *Quercus phellos*.

Erythroneura comoides n. sp.

This is a sister species with the preceding, differing from it in the shorter, posterior point and the shape of the aedeagus.

Length 2.9 mm. Color cream with a fairly bright red lattice formed by the linking up of the ends of the usual marks of the group, giving the species the appearance of certain members of the Comes Group. Male genitalia as in figure 29. Pygofer hook elongate, slender, and curved gracefully both mesad and dorsad. Style with foot oblique to shaft, the anterior point short and sharp, the posterior point a little longer and also sharp, curved slightly over instep. Aedeagus with upper portion of socket expanded into a large, shield-shaped, sclerotized plate from which the phalicata arises; phalicata fairly short, lateral aspect narrowing toward tip, ventral aspect slightly vasiform due to a central constriction, and with serrate lateral margins.

Holotype, male, Chiefland, Fla., Dec. 17, 1949, Stannard et al., on *Quercus myrtifolia*. Allotype, female, Perry, Fla., Dec. 17, 1949, Stannard et al., on *Myrica cerifera*. Paratypes, same data as holotype, 1 ♂; same data as allotype, 1 ♂.